AMENDMENTS TO THE CLAIMS

Please amend the claims as set forth hereinbelow.

1.-38. **(cancelled)**

39. **(previously presented)** A method ~~comprising:~~ comprising dynamically configuring ~~re-configuring~~ a configurable programmed holographic structure comprising a set of ~~optical characteristics,~~ diffractive elements and at least one optical port by introduction of energy to the configurable programmed holographic structure, thereby modifying at least one optical characteristic of the configurable programmed holographic structure,

wherein:

the diffractive elements of the set are collectively arranged, before or after configuring, so as to comprise temporal, spectral, or spatial transformation information,

each diffractive element of the set is individually contoured and positioned, before or after configuring, so as to reflectively image at least a portion of an input optical signal between an input optical port and an output optical port as the input optical signal propagates within the holographic structure,

the diffractive element set transforms, before or after configuring, the imaged portions of the input optical signal into an output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

~~structure so that, for an input optical signal interacting with the configurable programmed holographic structure, a first output optical signal which is output prior to dynamic re-configuration, the first output optical signal comprising a respective first spatial wavefront and a respective first temporal waveform, differs in at least one of spatial wavefront and temporal waveform from a second output optical signal comprising a respective second spatial wavefront and a respective second temporal waveform, the second output optical signal to be output after dynamic re-configuring is effected.~~

40. **(cancelled)**

41. **(currently amended)** The method of claim 39, wherein the energy is ~~supplied~~ introduced through a conductive trace, the trace coupled to the configurable programmed holographic structure.

42. **(previously presented)** The method of claim 39, wherein the modified optical characteristic is an index of refraction of a diffractive element.

43. **(previously presented)** The method of claim 39, the configurable programmed holographic structure further comprising a plurality of segments, each segment comprising at least one diffractive element, each segment comprising an average index of refraction.

44. **(previously presented)** The method of claim 43, wherein the modified optical characteristic is the average index of refraction of at least one segment.

45. **(previously presented)** The method of claim 43, each segment comprising a spatial structure.

46. **(currently amended)** The method of ~~claim 44~~ claim 44, the dynamic configuration ~~re-configuration~~ effected by changing the spatial structure of at least one segment.

47. **(currently amended)** The method of claim 43, the configurable programmed holographic structure further comprising at least one gap comprising a material having a refractive index, the at least one gap situated between two adjacent segments, the energy introduced coupling with the at least one gap to effect dynamic ~~re-configuration...~~ configuration.

48. **(previously presented)** The method of claim 47, wherein the energy introduced is to change the refractive index of the material.

49. **(previously presented)** The method of claim 47, wherein the energy is supplied through at least one conductive trace coupled to the at least one gap.

50. **(currently amended)** The method of claim 43, wherein a segment comprises a plurality of sub-segments each of which comprises an index of refraction, and

wherein the energy introduced coupling with at least one sub-segment is to effect dynamic ~~re-configuration~~ configuration.

51.-63. **(cancelled)**

64. **(currently amended)** A method comprising:

~~receiving at least one optical signal into a configurable programmed holographic structure comprising a plurality of output ports;~~

configuring ~~the~~ a configurable programmed holographic structure to ~~direct the at least one~~ route at least a portion of an optical signal ~~to~~ between at least one chosen first optical port and at least one chosen ~~output~~ second optical ~~port;~~ port, the configurable programmed holographic structure comprising a set of diffractive elements and at least one optical port;

receiving via an input optical port at least one optical signal into the configurable programmed holographic structure;

~~directing the at least one~~ routing at least a portion of the optical signal ~~to~~ between the input optical port and an output optical port; and ~~the at least one chosen output port; and~~

providing, at the ~~at least one chosen~~ output optical port, the routed portion of the ~~at least one~~ optical signal as an output optical signal. [.]

wherein:

the diffractive elements of the set are collectively arranged, after configuring, so as to comprise temporal, spectral, or spatial transformation information,

each diffractive element of the set is individually contoured and positioned, after configuring, so as to reflectively image at least a portion of the optical signal between the first optical port and the second optical port as the optical signal propagates within the holographic structure,

the diffractive element set transforms, after configuring, the imaged portion of the optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

65. **(currently amended)** The method of claim 64, wherein the configurable programmed holographic structure ~~comprising a~~ comprises a configurable de-multiplexer.

66. **(currently amended)** The method of claim 64, wherein the configurable programmed holographic structure comprises a configurable multiplexer.

67.-74. **(cancelled)**

75. **(currently amended)** A method comprising:

applying ~~an~~ energy in a time-varying manner to a configurable programmed holographic structure comprising a set of diffractive elements and at least one optical port, the diffractive elements of the set collectively defining a set of program characteristics, at least one of which varies with energy applied to the configurable programmed holographic structure, thereby varying the set of program characteristics in a time-varying manner;

receiving an input optical signal via an input port into the configurable programmed holographic structure, the input optical signal interacting with the diffractive element set of the configurable programmed holographic structure, thereby producing a modulated optical signal that is modulated in a time-varying manner; and

providing the modulated optical signal at an output ~~port.~~ port,

wherein:

each diffractive element of the set is individually contoured and positioned so as to reflectively image at least a portion of the input optical signal between the input port and the output port as the input optical signal propagates within the holographic structure,

the diffractive element set transforms the imaged portions of the input optical signal into the modulated optical signal according to the time-varying set of program characteristics as the optical signals propagate within the optical medium between the input port and the output port.

76.-80. **(cancelled)**

81. **(currently amended)** A method comprising:

receiving an input optical signal via an input optical port into a configurable programmed holographic structure comprising a set of diffractive elements and at least one optical port, the diffractive elements of the set collectively defining a set of program characteristics and a proper operating wavelength range, the input optical signal interacting with the configurable programmed holographic structure;

directing the input optical signal to interact with the configurable programmed holographic structure, producing an output optical signal having an output power at an output optical port;

directing the output optical signal onto a power measurement device; and

modifying the program characteristics of the configurable programmed holographic structure to maximize the output power, as measured ~~by a~~ by the power measurement ~~device.~~ device,

wherein:

each diffractive element of the set is individually contoured and positioned so as to reflectively image at least a portion of the input optical signal between the input port and the output port as the input optical signal propagates within the holographic structure,

the diffractive element set transforms the imaged portions of the input optical signal into the output optical signal according to the set of program characteristics as the optical signals propagate within the optical medium between the input port and the output port.

82. **(previously presented)** The method of claim 81 further comprising modifying the set of program characteristics by applying an energy to the configurable programmed holographic structure, for which at least one of the set of program characteristics varies with energy applied to the configurable programmed holographic structure.

83.-84. **(cancelled)**

85. **(new)** The method of Claim 39, wherein the diffractive elements of the set are collectively arranged, before or after configuring, so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

86. **(new)** The method of Claim 85, wherein:
the diffractive elements of the set are collectively arranged, before configuring, so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set; and
the diffractive elements of the set are collectively arranged, after configuring, so as to exhibit altered positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

87. **(new)** The method of Claim 39, wherein the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

88. **(new)** The method of Claim 87, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into an altered output optical signal according to altered transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port, the altered output optical signal differing from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

89. **(new)** The method of Claim 87, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into an altered output optical signal according to altered transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port, the altered output optical signal differing from the output optical signal in temporal waveform or optical spectrum.

90. **(new)** The method of Claim 87, wherein configuring the holographic structure results in substantial elimination of the output optical signal.

91. **(new)** The method of Claim 39, wherein the diffractive element set transforms, after configuring, the imaged portions of the input optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port.

92. **(new)** The method of Claim 91, wherein the output optical signal is substantially absent before configuring.

93. **(new)** The method of Claim 39, wherein the input optical port and the output optical port comprise a common optical port.

94. **(new)** The method of Claim 39, wherein the input optical port and the output optical port comprise distinct optical ports.

95. **(new)** The method of claim 39, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

96. **(new)** The method of claim 39, wherein the energy introduced is electromagnetic energy.

97. **(new)** The method of claim 39, wherein the energy introduced is thermal energy.

98. **(new)** The method of claim 39, wherein the energy introduced is photonic energy.

99. **(new)** The method of claim 39, wherein the energy introduced is acoustic energy.

100. **(new)** The method of claim 39, wherein the energy introduced is nuclear energy.

101. **(new)** The method of claim 39, wherein the energy introduced is chemical energy.

102. **(new)** The method of claim 39, wherein the energy introduced is electrical energy.

103. **(new)** The method of Claim 41, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

104. **(new)** The method of Claim 41, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

105. **(new)** The method of Claim 64, wherein the diffractive elements of the set are collectively arranged, before or after configuring, so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

106. **(new)** The method of Claim 105, wherein:
the diffractive elements of the set are collectively arranged, before configuring, so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set; and
the diffractive elements of the set are collectively arranged, after configuring, so as to exhibit altered positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

107. **(new)** The method of Claim 64, wherein:
the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into an initial output optical signal according to initial transformation information as the optical signals propagate within the holographic structure between the first optical port and the second optical port; and
the initial output optical signal differs from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

108. **(new)** The method of Claim 64, wherein:
the diffractive element set transforms, before configuring, the imaged portions of the input optical signal into an initial output optical signal according to initial transformation information as the optical signals propagate within the

holographic structure between the first optical port and the second optical port; and

the initial output optical signal differs from the output optical signal in temporal waveform or optical spectrum.

109. **(new)** The method of Claim 64, wherein the output optical signal is substantially absent before configuring.

110. **(new)** The method of Claim 64, further comprising re-configuring the configurable programmed holographic structure to route at least a portion of an optical signal between the first optical port and the second optical port, wherein:

the diffractive elements of the set are collectively arranged, upon the configurable programmed holographic structure being re-configured, so as to comprise altered temporal, spectral, or spatial transformation information,

the diffractive element set transforms, upon the configurable programmed holographic structure being re-configured, the routed portion of the optical signal into an altered output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the first optical port and the second optical port, the altered output optical signal differing from the output optical signal in temporal waveform, optical spectrum, or spatial wavefront.

111. **(new)** The method of Claim 110, further comprising re-configuring the configurable programmed holographic structure so as to substantially eliminate the output optical signal.

112. **(new)** The method of Claim 64, wherein the first optical port and the second optical port comprise a common optical port.

113. **(new)** The method of Claim 64, wherein the first optical port and the second optical port comprise distinct optical ports.

114. **(new)** The method of claim 64, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

115. **(new)** The method of claim 64, wherein the holographic structure is configured by introducing energy into the holographic structure through a conductive trace, the trace coupled to the configurable programmed holographic structure.

116. **(new)** The method of Claim 115, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

117. **(new)** The method of Claim 115, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

118. **(new)** The method of Claim 75, wherein the diffractive elements of the set are collectively arranged so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

119. **(new)** The method of Claim 75, wherein the input optical port and the output optical port comprise a common optical port.

120. **(new)** The method of Claim 75, wherein the input optical port and the output optical port comprise distinct optical ports.

121. **(new)** The method of claim 75, the programmed holographic structure further comprising a variable spatial structure, and wherein varying the set of program characteristics comprises varying the spatial structure.

122. **(new)** The method of claim 75, wherein the energy is applied to the holographic structure through a conductive trace, the trace coupled to the configurable programmed holographic structure.

123. **(new)** The method of Claim 122, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

124. **(new)** The method of Claim 122, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.

125. **(new)** The method of claim 75, further comprising applying the energy through a conductive trace which is coupled with the programmed holographic structure.

126. **(new)** The method of claim 75, wherein the input optical signal interacts with the configurable programmed holographic structure to produce one of an optical signal encoded with multi-level phase shift key coding, and a multi-level phase shift key-decoded optical signal.

127. **(new)** The method of claim 75, the programmed holographic structure further comprising a gap situated between two adjacent diffractive elements, the gap comprising an index of refraction, and wherein changing a program characteristic further comprises changing the index of refraction of the gap.

128. **(new)** The method of claim 75, the programmed holographic structure further comprising at least one segment, and wherein varying a program characteristic further comprises changing the index of refraction of the at least one segment.

129. **(new)** The method of claim 75, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

130. **(new)** The method of Claim 81, wherein the diffractive elements of the set are collectively arranged so as to exhibit positional variation in amplitude, optical separation, or spatial phase over some portion of the set.

131. **(new)** The method of Claim 81, wherein the input optical port and the output optical port comprise a common optical port.

132. **(new)** The method of Claim 81, wherein the input optical port and the output optical port comprise distinct optical ports.

133. **(new)** The method of claim 81, wherein the holographic structure comprises a planar waveguide substantially confining in one dimension the optical signals propagating in two dimensions therein.

134. **(new)** The method of claim 81, wherein the program characteristics are modified by introducing energy into the holographic structure through a conductive trace, the trace coupled to the configurable programmed holographic structure.

135. **(new)** The method of Claim 134, wherein at least one conductive trace is positioned and contoured so as to substantially correspond to one of the diffractive elements.

136. **(new)** The method of Claim 134, wherein the energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled.